Rule DAS607:   VSAM data set is close to maximum number of extents

Finding: CPExpert determined that a VSAM data set has had a significant number of secondary allocations, and is close to reaching the maximum number of extents.

Impact: This finding is used to assess potential problems with VSAM data sets reaching the maximum number of extents. The finding can have a HIGH IMPACT if the VSAM data set reaches the maximum number of extents.

Discussion: When a VSAM data set is allocated, space allocation amounts normally are specified for both a primary allocation and a secondary allocation.   When the primary amount on the first volume is used up, a secondary amount is allocated on that volume by the end-of-volume (EOV) routine, using the amount specified for the secondary allocation.

This space allocation process can be repeated until the volume is out of space or until the extent limit is reached. Depending on the type of data set allocation request, a new volume may be used if the current volume is out of space.

A VSAM data set can have up to 255 extents per component, and a striped VSAM data set can have up to 255 extents per stripe. The last four extents are reserved for extending a data set when the last extent cannot be allocated in one piece. (VSAM attempts to extend a data set when the total number of extents is less than 250.

When a multivolume VSAM data set extends to the next volume, the data class specifies if the initial space allocated on that volume is the primary or secondary amount. The default is the primary amount. After the primary amount of space is used up, space is allocated in secondary amounts. By using a data class, it is possible to indicate whether to take a primary or secondary amount when VSAM extends to a new volume.

An ABEND results when an extend as attempted, but the maximum number of extents was reached. CPExpert attempts to provide an "early warning" of this potential situation.

CPExpert examines the SMF Type 64 information contained in MXG TYPE64 data set to identify VSAM data sets that have used a significant number of extents, such that there is danger of reaching the maximum extents. CPExpert compares NREXTENT variable (the total number of extents in the VSAM data set) with the **MXEXTENT** guidance variable in USOURCE(DASGUIDE). CPExpert produces Rule DAS607 when the

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NREXTENT is greater than the value specified by the MXEXTENT guidance variable **and** at least one extent was allocated during the current OPEN of the data set (CPExpert uses the NREXTNTS variable in TYPE64 for this decision).

The default value of the MXEXTENT guidance variable is 225, indicating that CPExpert should produce Rule DAS607 when at least 225 extents have been allocated for a VSAM data set. Since the maximum allowable is 255, the default value provides a threshold at which CPExpert provides notification that there is a potential problem.

The following example illustrates the output from Rule DAS607:

```
RULE DAS607: VSAM DATA SET IS CLOSE TO MAXIMUM NUMBER OF EXTENTS

   VOLSER: RLS003.  More than 225 extents were allocated for the VSAM data
   sets listed below.  The VSAM data sets are approaching the maximum
   number of extents allowed. The below shows the number of extents
   and the primary and secondary space allocation:
                                                   ..    TOTAL    EXTENTS   ---ALLOCATIONS---
   SMF TIME STAMP     JOB NAME  VSAM DATA SET       ..   EXTENTS  THIS OPEN  PRIMARY SECONDARY
   10:30,11MAR2002    CICS2ABA  RLSADSW.VF01D.DATAENDB.DATA................  229      4        30 CYL    100 CYL
```

Suggestion: If CPExpert produces Rule DAS607, you should consider the following alternatives:

- Determine (potentially by consulting with applications personnel) whether the VSAM data set is expected to continue increasing. If the VSAM data set is expected to continue increasing, you should take action. IBM suggests that you (1) use the access method services REPRO command to make a backup copy of the cluster that contains the data set, (2) delete the cluster from the catalog with the DELETE command, (3) use the DEFINE command to redefine the cluster in the catalog with increased space allocation, and (4) reload the backup of the cluster with the REPRO command. If this alternative is selected, you should consider **significantly** increasing the primary allocation value and consider increasing the secondary allocation value.

- Alternatively, you should examine the amount of space actually used in the VSAM data set by logical records, compared with free space or space used by deleted logical records (depending on the type of VSAM data set). It is possible that inappropriate values have been specified for the FREESPACE parameter.

  The percentages of free space should yield full records and full control intervals with a minimum amount of unusable space. If too much free space was specified for the Control Intervals or Control Areas, there

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would be more direct access storage required to contain the data set. This unnecessary free space could cause the data set to be unnecessarily large, and cause extents to be acquired more often.

You can use LISTCAT to examine statistics about the space used and the free space allocated and used.

- If the above actions are not appropriate, you can change the MXEXTENT guidance variable in USOURCE(DASGUIDE). Section 3 describes how to change the MXEXTENT guidance variable if you feel that Rule DAS607 is produced prematurely.

- Alternatively, you can exclude the reported VSAM data sets from analysis. Section 3 describes how to exclude VSAM data sets from analysis. However, you should be aware that no analysis of potential VSAM problems will be performed on data sets that are excluded from analysis.

Reference: *DFSMS: Using Data Sets* (SC26-7339 for OS/390; SC26-7410 for z/OS)
Section 2.2.2.4: Allocating Space for VSAM Data Sets
Section 2.5.3:   Optimizing Free Space Distribution

VSAM Demystified Redbook (SG24-6105)
Section 2.6: Parameters affecting performance